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RANGE IMPROVEMENT

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(RGR - OGDEN)

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies, and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these **RANGE IMPROVEMENT NOTES** are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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ECONOMICS OF RANGE TILLAGE

(Excerpts from a paper by Russell D. Lloyd and Glen D. Fulcher, Agricultural Economist, Farm Economics Research Division, Agricultural Research Service, Reno, Nevada. Assistant Professor, Department of Agricultural Economics, University of Nevada, Reno, Nevada.)

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According to the dictionary, to till is "to plow and prepare for seed, and to sow, dress, raise crops from, etc." In a broader sense, "tillage" may include seeding without soil cultivation, as after an accidental or planned burn, and what we say here will apply also to many range treatments that do not include planting of seed.

Before proceeding to a discussion of the economics of range tillage, let's define economics. A review of literature and an examination of available definitions leads us to this simplified generalization:

Economics is the science of allocation of scarce resources among competing human wants.

Economists are often chided by specialists in the physical sciences for the methods they use and their dependence on theoretical analysis.

A basic difference between physical-biological research and economic research is that the one deals with what can be done and the other deals with what people choose to do.

Man has used the range resource, by means of wild or domestic animals, throughout history. In many parts of the world, this use has been so intensive and so competitive that serious depletion has occurred. As the North American Continent was discovered, explored, settled, and developed, the range resource changed from a free good to a scarce one---and competition intensified. At first the range was used by those who could capture and hold it. Later, competition increased and serious conflicts arose. Some were temporarily settled with gunpowder. Eventually, conflicts were settled partly by institutional means. Fortunately, Federal control of public ranges was instituted in time to save the resource from destruction through unbridled competition. Competition for the range resource continues. As it became a scarce resource, range became a fit subject for economic analysis.

As a relatively free resource, the range was utilized as nature provided it or as previous users left it. As range became scarce, man began to apply his scientific and technological abilities to increase production from the limited amounts of range available to him. The common sequence has been:

- (1) Recognition of a problem, such as low forage production.
- (2) Development of a method of overcoming the problem, as by seeding.
- (3) Promotion of the method for use by private and public land managers.

Usually much later, someone asks, "Is this method economically feasible?" or "Does it pay?" All too often, economics has been ignored in the haste to advocate and push ahead with what appear to be desirable practices. Thus the missing link, which belongs properly between "development" and "promotion," is economic analysis. This weakness appears to have resulted from overenthusiasm on the part of technicians and the failure of economists to give attention to range problems and to develop necessary analytical techniques.

The economist's objective is to make it possible for ranchers, land managers, and others to use these methods and data in analyzing their opportunities and in making decisions. There is no single "correct" answer to an economic problem that will hold for all situations over time. The answer varies among individuals, among situations and through time.

Studies of economics of range resource use date back to the early 1900s. These pioneer efforts were mostly descriptive and were relatively scarce. Economic research into range use and improvement was intensified 6 or 8 years ago. One of the first problems studied was the economics of range-improvement practices. Most of this work has been done on individual practices or treatments from the private rancher's viewpoint. Economics research into government range operations has been limited. In States where public ranges are common, most of the money spent on tillage practices has come from the Federal Treasury, yet little study has been given the economic problems of government investment in range improvement. Economics research concerning range tillage and related practices is a relatively new thing. A great many questions remain to be answered.

When tillage practices are studied without consideration of their relation to either the ranch organization or public land management problems, the considerations are simply:

1. What does the practice cost?
2. What is it expected to return?
3. What is the difference between costs and returns?

Studies of seeding big sagebrush ranges to crested wheatgrass in Nevada 1/ and Utah 2/ have led us to identify the following as pertinent costs of seeding:

1. Removal of unwanted vegetation
2. Preparation of a seedbed
3. Seed
4. Planting
5. Nonuse until the new grass is ready
6. Fencing
7. Pest control
8. Overhead
9. Risk
10. Renovation
11. Water development
12. Interest on investment
13. Operation and maintenance of water developments and fences.

Not all items in this list are pertinent costs for each seeding. The total cost for any project is the sum of several of these component costs, depending upon the methods used in accomplishing the project.

For seedings planted in northern Nevada the following is the indicated relative importance of each of the costs, based on a 20-year amortization period:

Average annual total cost, \$1.06 per acre. 3/
Average carrying capacity of seeded land, 3-1/2 acres per AUM.
Average annual cost, \$3.71 per AUM.

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- 1/ From Costs and Returns of Range Reseeding in Nevada, soon to be published by the Nevada Agricultural Experiment Station.
 - 2/ From Costs and Returns from Seeding Publicly owned Sagebrush-Grass Ranges to Crested Wheatgrass. Thesis work in progress for Utah State University.
 - 3/ Based on a 6% rate of interest and a 20-year amortization period.

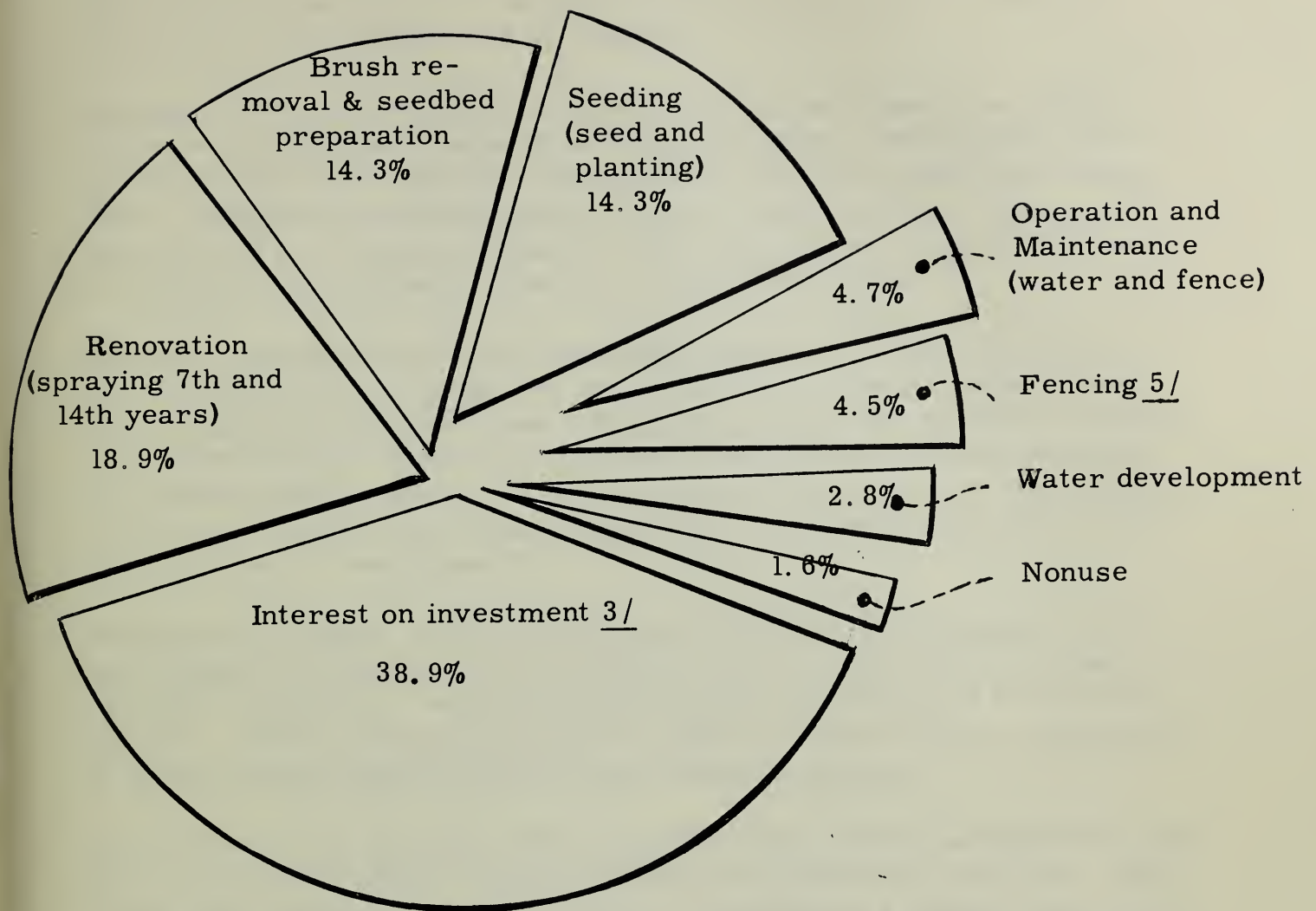


Figure 1. Average costs of crested wheatgrass seedings, northern Nevada sagebrush-grass ranges, 1955. 4/

In most public agency reports and in most popular literature, only part of the cost story is told. Frequently, such reported costs include those of brush control and seedbed preparation, seed, and planting. From figure 1, we see that these are only about 29% of all costs. Sometimes costs of nonuse and interest on investment are included. Commonly, the rest are not included. This tends to result in unrealistically low-cost figures and to provide a misleading basis for decision making.

4/ From Costs and Returns of Range Reseeding in Nevada, op. cit.

5/ Fencing costs were charged 50% to the seeding and 50% to ranch management.

Evaluation of returns from range seeding or other tillage practices has proved to be difficult. Returns may be classified as of two general kinds, (1) intangible and (2) tangible.

Intangible returns are real and have value, but at present we cannot measure or express them with our usual methods. Intangibles more often accrue to the whole of society rather than to an individual range user. Examples are conservation of soil, conservation of water, stabilization of the livestock industry, and improvement of game habitats through shifting domestic livestock to improved range.

Tangible returns result from increases in physical production due to the tillage practice. Tangibles usually accrue to the stockman whose animals graze the treated land. Tangible returns are realized in terms of improved calf or lamb crop, greater total gains by salable animals, and reduced death losses. Of direct benefit to the rancher, but perhaps a little less tangible are reduced operating risks and simplification and lowered costs of management.

Although it is easier to deal with tangible returns than intangible ones, the complex transformations of range forage to live animal, to meat carcass, to dollars---make measurements, estimates and evaluations difficult. These transformations are highly variable and are influenced by many uncontrollable physical and economic factors.

All too often it is assumed that economics ends with the analysis of costs and returns for a single range improvement project or operation. This is far from the truth. A rancher who contemplates a range tillage practice must consider not only probable costs and expected returns from the practice, but also his alternative opportunities. For example a rancher might increase his income more by investing in better bulls, improving pastures, or fencing his range than by seeding a given range. These are realities which the commercial rancher must consider. This helps explain the apparent lack of interest in range tillage practices on the part of some ranchers. With a limited amount of operating capital, they can often make more money through investments other than range tillage. Let us remember that commercial ranchers are in business to make money. The importance of conservation to ranchers depends upon whether conservation practices will return income and/or other satisfactions over time equal to or greater than will other alternatives.

When society finds that range tillage, which is desirable from a conservation standpoint, is not practiced by private landowners because of the relative lack of profitability, it may choose to pay for a share of such

practices. Theoretically, society and the rancher should each pay in proportion to benefits received. Our society has chosen to establish a program under which the government pays a percentage of certain tillage practice costs incurred by ranchers. The stated objective of this program is to further conservation of soil and water resources-- to the eventual benefit of society as a whole.

The public range manager also faces alternatives. Here, as well as on private land, economic analysis should not stop at costs and returns for a single practice. However, many factors complicate adequate economic analysis of public land agency projects and alternatives. The majority of decisions are administrative ones made within a rigid institutional framework and are often influenced by various pressures. In addition, the manager of public lands is often bound by legislative and administrative stipulations as to how certain funds may be spent. These factors limit the ability of public land managers to make decisions based on economic criteria. This institutional situation and the fact that intangible returns are important from the public viewpoint, make more difficult the task of any economist who undertakes to examine the economics of public range tillage projects.

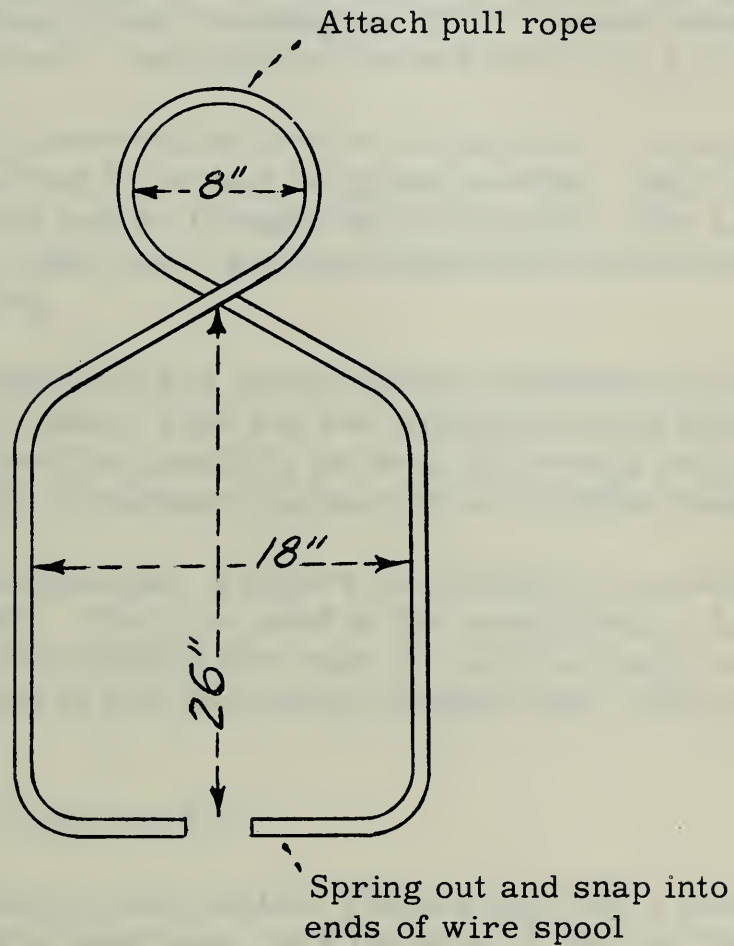
It is realized that political and institutional factors, not economics, will continue to play the major role in public range policy decision making. Nevertheless, economic problems are worthy of serious examination. Although it is recognized that economics is not the only yardstick for public range decisions, society deserves to be informed of how much it is paying for and receiving from range conservation and management. This will become more and more important as multiple use pressures on the range increase.

Prepared for presentation at the 12th Annual Meeting,
American Society of Range Management, Tulsa,
Oklahoma, January 30, 1959.

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ONE-SPOOL BARBED WIRE STRINGER

Designed by Victor Arzuaga, Guard
Humboldt National Forest



Materials: This tool is constructed from one piece of 3/4-inch bar stock 9 feet long.

Advantages:

- (1) One-piece, light and sturdy
- (2) Inexpensive
- (3) No sharp corners to catch on brush or rock

JUTE MATTING SAVES SLOPES

(Excerpts from a paper by Lester Fox, Soil Conservation Service, Upper Darby, Pennsylvania - published in HIGHWAY MAGAZINE, January 1960.)

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Maryland state highway engineers had a troublesome roadside ditch in Prince Georges County near Washington, D. C. Grass seeding after seeding washed out. Deep gullies formed after every hard rain.

With the help of Soil Conservation Service technicians, the highway engineers tried jute matting to protect the grass seeding. Rain came but the runoff slid over the jute as though it were greased. The soil held and the grass grew. Since then, highway departments have shown great interest in jute matting.

Jute matting is the latest thing to protect grass seedings in critical areas. It's the same kind of stuff you see wrapped around bales of cotton. It has been used successfully on farm waterways and steep slopes, stream banks, in highway ditches and on roadside banks.

Here's how to use jute matting: Prepare the seedbed as usual but don't cultipack the soil. Plant the seed at the normal rate. Lay the jute over the part of the seedbed that rain or runoff is likely to wash out. Overseed the jute at half the normal seeding rate. Roll or cultipack the jute.

Don't mulch under or over the jute.

Caution: Keep the jute in close contact with the soil like a mustard plaster. At the slope's upper end, tuck the edge of the jute into a slot or trench 4 to 6 inches deep. Tamp the soil firmly back in place. If you need more than one roll of jute, tuck the upper edge of each roll into the same kind of slot. Let 4 or 5 inches of the upper roll overlap the lower roll.

Use enough width to keep water from sloshing over the sides. If you need more than one width, overlap the edges.

The important thing is to prevent water getting under the jute. Peg the matting down with No. 8 wire made into staples 6 to 8 inches long. Pegs every 6 feet or even farther apart ought to do the job. The jute rots and adds organic matter to the soil.

The jute comes in rolls 75 yards long and 50 inches wide. You can get it in a standard mesh or a more open mesh. SCS men use the standard weave on only the most critical areas. Usually the more open weave does the job. The jute costs around \$15 to \$16 a roll. Each roll weighs about 90 pounds.

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Prejudice is a great timesaver. You can form opinions without having to get the facts.

THE NEW OREGON GRASS SEEDER 1/ LOOKS GOOD

(Excerpts from a paper by D. E. Booster, agricultural engineer, Oregon Agricultural Experiment Station, who designed and constructed the Oregon Grass Seeder.)

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Soil firming and furrow placement of seed has given faster emergence, 2-3 times more survival, and higher yields after stands are established. These are some of the reasons why the new Oregon Grass Seeder looks good.

The Oregon Grass Seeder employs new techniques for seed placement that appear especially desirable on soft range seedbeds. The seed is placed in pressed furrows, on firm soil, and then covered with loose soil.

This is accomplished with press wheels serving a dual purpose. Besides firming the soil prior to seed placement, the press wheels also act as furrow openers. Each wheel makes a track 6 inches wide. A V-shaped rib around the center of the wheel presses a seed furrow 1 inch deep in the center of the wheel track. The grass seed is dropped into the seed furrows and covered by drag links.

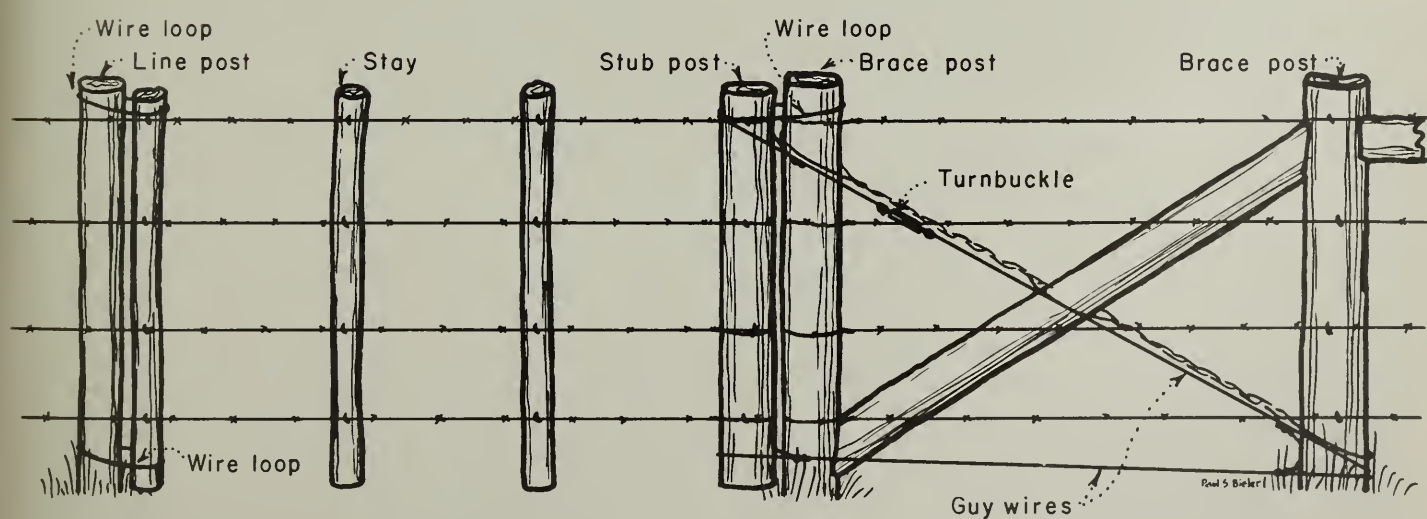
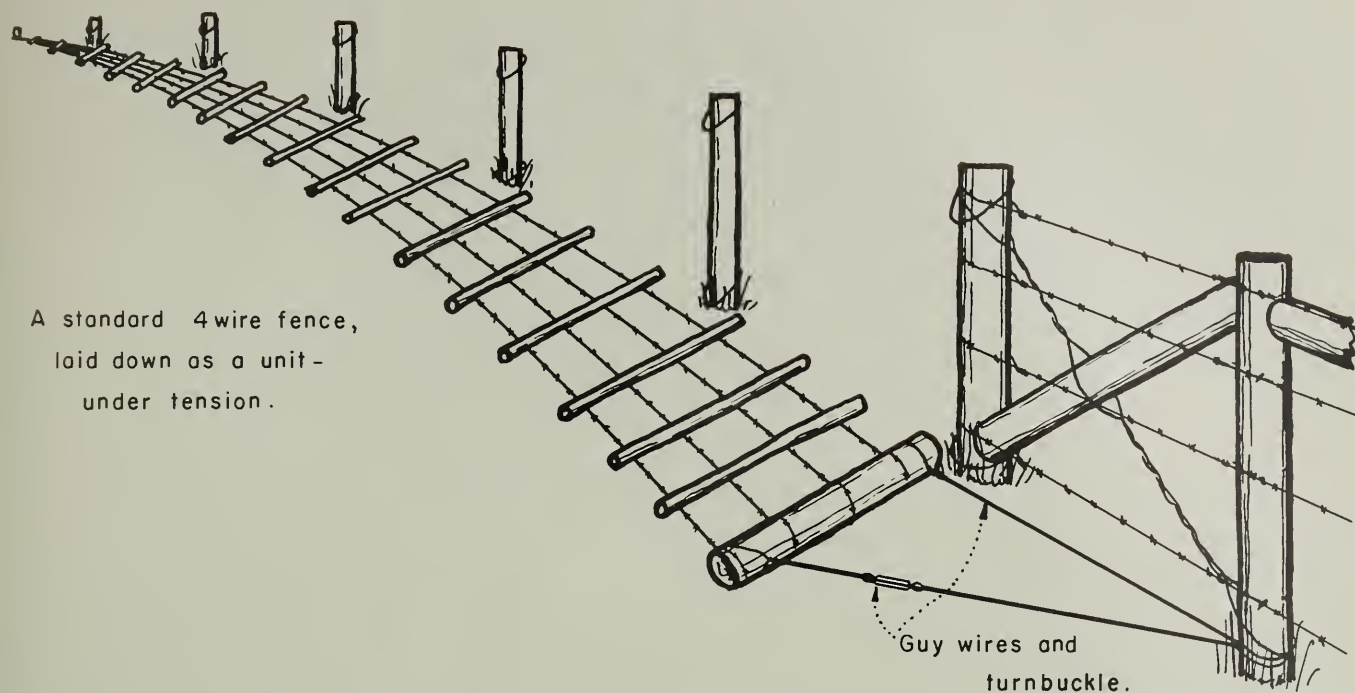
The seeder has sturdy construction and withstands rough treatment. Each press wheel is individually suspended to permit operation on rough terrain where rocks and brush may be encountered. A compression-type coil spring transmits frame weight to the press wheels. One test model is an 8-row seeder weighing 2,600 pounds. Extra weight, up to 600 pounds per wheel, may be carried in weight boxes on the frame to give the desired wheel-track depth in different soil conditions. On firm seedbeds wheel tracks are faint but seed furrows are pressed to the full 1-inch depth and provide excellent seed placement.

The seed is permitted to free-fall from the seed metering units, through seed tubes, into the V-shaped furrows in the center of the wheel tracks. Tension-type, close-wound coil springs are used as the lower portions of the seed tubes that protrude below the frame behind the wheels. The springs snap back into position after being deflected by rocks or brush.

1/ This seeder is not available for purchase though it is hoped that a few models will be built under special contract before too long. Efforts are being made to get plans and formulate a contract.

A drag link fastened to the lower end of each seed tube covers the seed. Fairly heavy drag links are required for closing seed furrows on moist and on firm seedbeds. Standard grain drill drags are sufficient on soft soil.

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A laydown fence for snow country

Where damage from snow is severe on standard wire fences, a laydown fence as shown above has reduced maintenance costs by two-thirds on Black Mesa in western Colorado. Basically it is a standard 4-wire fence that can be laid down as a unit. One man can let it down or put it up almost as fast as he can walk.

